

We Claim:

1. An arrangement comprising:

a channel code encoder responsive to an applied input signal,

a space-time encoder responsive to output signal of said channel code encoder; and

a modulator responsive to said space time-encoder.

2. The arrangement of claim 1 further comprising pulse shaping circuitry and at least two antennas for transmitting a space-time coded signal created by said space-time encoder and modulated by said modulator.

3. A transmitter comprising:

a demultiplexer responsive to an applied input signal for developing a plurality of at least two signal streams, and

a like plurality of channel coding/space-time coding transmitters, each responsive to a different signal stream of said plurality of signal streams.

4. The transmitter of claim 3 where each of said channel coding/space-time coding transmitters comprises:

a channel coder of rate R_i ,

a space-time encoder responsive to output signal of said channel code encoder,

a modulator responsive to said space time-encoder,

pulse shaping circuitry responsive to said modulator, and

at least two antennas for transmitting a space-time coded signal created by said space-time encoder, modulated by said modulator, and conditioned by said pulse shaping circuitry.

5. The transmitter of claim 4 where said demultiplexer develops an L plurality of signal streams, where said channel coders in said L channel coding/space-time coding transmitters develop rates R_i $i=1,2,...,L$, that are not identical to each other.

6. The transmitter of claim 4 where said demultiplexer develops an L plurality of

Sub B1
signal streams, where said channel coders in said L channel coding/space-time coding transmitters develop rates R_i $i=1,2,\dots,L$, that are such that $R_1 > R_2 > \dots > R_L$.

SUB A1
5 7. The transmitter of claim 1 where said channel code encoder performs trellis encoding.

8. The transmitter of claim 1 where said channel code encoder performs ~~convolutional encoding~~.

10 9. A receiver comprising:
a detector of space-time coded signal; and
a decoder for decoding a channel code encoded signal that is embedded in output signals of said detector. a

15 10. The receiver of claim 9 where said detector employs a MMSE IC decoder.

SUB A2
11. The receiver of claim 9 where said detector employs a two step algorithm to develop a weights vector for canceling interfering signals from terminals other than a given terminal whose signal is being detected.

20 12. The receiver of claim 11 where said two step algorithm is:

$(\hat{\mathbf{c}}, \hat{\mathbf{s}}) = \text{II.DECODE}(\mathbf{r}_1, \mathbf{r}_2, \mathbf{H}_1, \mathbf{H}_2, \mathbf{G}_1, \mathbf{G}_2, \Gamma)$
 $\{$
 $(\hat{\mathbf{c}}_o, \Delta_{c,o}) = \text{MMSE.DECODE}(\mathbf{r}_1, \mathbf{r}_2, \mathbf{H}_1, \mathbf{H}_2, \mathbf{G}_1, \mathbf{G}_2, \Gamma)$
 $\mathbf{x}_1 = \mathbf{r}_1 - \mathbf{H}_1 \cdot \hat{\mathbf{c}}_o, \quad \mathbf{x}_2 = \mathbf{r}_2 - \mathbf{H}_2 \cdot \hat{\mathbf{c}}_o$
 $f(\mathbf{s}) = \|\mathbf{x}_1 - \mathbf{G}_1 \cdot \mathbf{s}\|^2 + \|\mathbf{x}_2 - \mathbf{G}_2 \cdot \mathbf{s}\|^2$
 $\hat{\mathbf{s}}_o = \arg \min_{\mathbf{s} \in \mathbf{S}} (f(\mathbf{s})) \quad , \quad \Delta_{s,o} = f(\mathbf{s})$
 $(\hat{\mathbf{s}}_1, \Delta_{s,1}) = \text{MMSE.DECODE}(\mathbf{r}_1, \mathbf{r}_2, \mathbf{G}_1, \mathbf{G}_2, \mathbf{H}_1, \mathbf{H}_2, \Gamma)$
 $\mathbf{y}_1 = \mathbf{r}_1 - \mathbf{G}_1 \cdot \hat{\mathbf{s}}_1, \quad \mathbf{y}_2 = \mathbf{r}_2 - \mathbf{G}_2 \cdot \hat{\mathbf{s}}_1$
 $f(\mathbf{c}) = \|\mathbf{y}_1 - \mathbf{H}_1 \cdot \mathbf{c}\|^2 + \|\mathbf{y}_2 - \mathbf{H}_2 \cdot \mathbf{c}\|^2$
 $\hat{\mathbf{c}}_1 = \arg \min_{\mathbf{c} \in \mathbf{C}} (f(\mathbf{c})) \quad , \quad \Delta_{c,1} = f(\mathbf{c})$

 If $(\Delta_{c,o} + \Delta_{s,o}) < (\Delta_{c,1} + \Delta_{s,1})$
 $(\hat{\mathbf{c}}, \hat{\mathbf{s}}) = (\hat{\mathbf{c}}_o, \hat{\mathbf{s}}_o)$
 Else
 $(\hat{\mathbf{c}}, \hat{\mathbf{s}}) = (\hat{\mathbf{c}}_1, \hat{\mathbf{s}}_1)$
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13. The receiver of claim 9 where said decoder for decoding a channel code is a trellis decoder.

14. The receiver of claim 9 where said decoder for decoding a channel code is a convolutional decoder.

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